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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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FISH & RICHARDSON P.C.
500 ARGUELLO STREET, SUITE 500
REDWOOD CITY, CA 94063

EXAMINER

FINEMAN, LEE A

ART UNIT PAPER NUMBER

2872

DATE MAILED: 09/11/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/899,481

Applicant(s)

LIU ET AL.

Examiner

Lee Fineman

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____

- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

✓ On page 3, line 21 in the Brief Description of the Drawings, "Fig. 4" should be --Figs. 4A and 4B--.

✓ On page 6, line 35 insert --(PBS)-- after splitter.

Appropriate correction is required.

✓ 2. The abstract of the disclosure is objected to because of undue length and use of legal phraseology, such as "means." Correction is required. See MPEP § 608.01(b).

Claim Objections

3. Claims 7 and 8 are objected to because of the following informalities:

✓ Claim 7 recites the "the four-port loop optical circulator of claim 7" in line 1 which is incorrect. For the purpose of examination claim 7 is treated on claim 6.

✓ In claim 8, when using an acronym at the first occurrence (i.e. PBS), the meaning should be expressly stated (see claim 4, lines 5-6 for example).

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1-4 are rejected under 35 U.S.C. 102(b) as being anticipated by Bergmann et al., US Patent No. 6,002,512.

Regarding claim 1, Bergmann et al. discloses a four-port loop optical circulator (figs. 1-3) comprising a first optical port (A), a second optical port (B), a third optical port (C) and a fourth optical port (D) for receiving an optical beam therein and a plurality of optical components for guiding a beam received from the first port to project from the second port, for guiding a beam received from the second port to project from the third port, for guiding a beam received from the third port to project from the fourth port, and for guiding a beam received from the fourth port to project from the first port (column 2, lines 13-24 and column 4, lines 36-39).

Regarding claim 2, Bergmann et al. discloses wherein the plurality of optical components includes a walk-off crystal (20) for generating a vertical optical path displacement for a vertical polarized beam (L2A, L2B) and for passing a horizontally polarized optical beam therethrough maintaining a same optical path (L_{1A}, L_{1B} and L_{3A}, L_{3B}).

Regarding claim 3, Bergmann et al. discloses wherein the plurality of optical components further includes a first birefringent crystal (12) disposed on a left hand side of the walk-off crystal for generating a first ordinary beam (L_{1AO}) and a first extra-ordinary beam (EL_{1B}) and a

second birefringent crystal (28) disposed on a right hand side of the walk-off crystal for generating a second ordinary beam (L_{2A}) and a second extra-ordinary beam (L_{2B}).

Regarding claim 4, Bergmann et al. discloses wherein the plurality of optical components further includes a first polarization rotation means (14, 16, 18) disposed on a left hand side of the walk-off crystal for generating a first state of polarization (SOP) for the first ordinary beam and the first extra-ordinary beam to project to the walk-off crystal and a second polarization rotation means (22, 24, 26) disposed on a right hand side of the walk-off crystal for generating a second SOP for the second ordinary beam and the second extra-ordinary beam to project to the walk-off crystal wherein the first SOP (column 3, lines 8-10) is orthogonal to the second SOP (column 3, lines 61-62).

6. Claims 9, 11 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Shirasaki et al., US Patent No. 6,226,115 B1.

Regarding claim 9, Shirasaki et al. discloses a loop optical circulator (fig. 2) and at least an optical switching means (214 and 218) for switching optical transmission paths of the loop optical circulator (column 3, lines 50-56).

Regarding claims 11 and 12, Shirasaki et al. discloses the switching means further comprising electrically controlled half wave plates composed of either electro-optic material or liquid crystal (column 7, lines 7-9).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergmann et al. in view of Cheng, US Patent No. 5,878,176.

Bergmann et al. further suggests the input/output capability of the fourth port (column 4, lines 36-39) but does not disclose a vertical displacement means like a polarization beam splitter (PBS) and a right angle prism for this purpose. Cheng teaches that the inclusion of a PBS (14), a right angle prism (13) and a first and second set of half wave plates (12 and 34) permits the extending of the input/output capability of an optical circulator (fig. 1c). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include a vertical displacement means like a PBS and right angle prism to extend the input/output capability of the fourth port as suggested by Bergmann.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki et al. in view of Bergmann et al.

Shirasaki et al. discloses the optical switching means comprising Faraday rotators that are surrounded by an electromagnetic pulse means for controlling a rotation direction (column 7, 18-23) but does not disclose the Faraday rotators being latched. Bergmann et al. teaches a set of

latched Faraday rotators (16, 18). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to latch the Faraday rotators of Shirasaki et al. to reduce the number of components (column 1, lines 56-58).

10. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki et al. in view of Riza, US Patent No. 6,282,336 B1.

Shirasaki et al. discloses the claimed invention except for the optical switching means further comprising an electrically controlled in/out DOVE prism. Riza teaches an optical switching means (fig. 1b) with an electrically controlled in/out DOVE prism (column 3, lines 65-67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the optical switching means of Riza in the circulator of Shirasaki et al. to have fine beam alignment controls (column 3, lines 4-5).

11. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jackel et al., US Patent No. 5,034,950 in view of Riza, US Patent No. 6,282,336 B1.

Jackel et al. discloses a loop optical circulator (column 1, lines 12-14) in so far as the laser beam loops through the system numerous times and at least an optical switching means (faraday rotator, column 1, line 37) for switching optical transmission paths of the loop optical circulator and a rhomb prism (column 1, line 55) but is silent as to whether it is electrically controlled. Riza teaches an electrically controlled prism within the switch (column 3, lines 65-67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the

Application/Control Number: 09/899,481
Art Unit: 2872

Page 7


invention was made to make the rhomb prism electrically controlled to have fine beam alignment controls (column 3, lines 4-5).

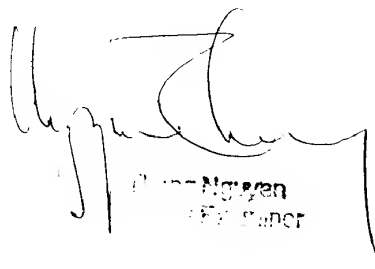
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lee Fineman whose telephone number is (703) 305-5414. The examiner can normally be reached on Monday - Friday 7:30 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on (703) 308-1687. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.


LAF
September 5, 2002


Lee Fineman
Examiner